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would keep its consequences in sight. But the pragmatist does not possess a mirror, and, more than that, like the goddess of justice he has a bandage on his eyes. Who can be blamed for not taking seriously philosophers whose wisdom (*inter alia*), is equivalent to saying that there are as many and more kinds of 'science' than there are religious sects!

"Still if a critique regardless of consequences is desired, we need only to be reminded that in every-day life there are also uncomfortable and even quite dreadful truths, truths which are none the less truths for all that; granite truths which can neither be shaken nor interpreted away, and against which all pragmatic balances and dialectic feats are powerless."

The strength of the author lies apparently in his critical powers. His positive suggestions will probably not be considered as helpful, yet the book is suggestive and pleasant reading throughout. P. C.

RECENT PERIODICALS.

The number of *Scientia* (*Rivista di Scienza*) for September, 1913, begins with an article by Aldo Mieli on the theory of substances with the pre-Socratic—this would be better described as pre-Aristotelian—Greeks. The first part, which is here published, contains an examination of those theories which were intended to explain the unceasing transformations of substances in nature, from the earliest speculations to Empedocles and including him. At the time of Empedocles's appearance, the problem was: all transformations being deceptive appearances of the senses, to seek what is true and stable behind all these false appearances. The solution of the problem, curiously enough, is obtained for the greater part by the adoption of a doctrine which had failed in geometry, the doctrine of the Pythagoreans (as Paul Tannery and others have shown) that geometrical figures are sums of points. This doctrine was partly destroyed by the discovery of incommensurable lengths and completely by the "triumphant" reasoning of Zeno. Future Greek mathematicians built up their splendid edifice of geometry on new and more secure foundations, but the fundamental conception of the theory of composition out of points passed into the theory of the composition of bodies. Three directions then presented themselves: (1) Empedocles's theory, which admitted of a limited number of primitive substances that are invariables and, by their mixture, make very different substances appear; (2) the theory of Anaxagoras, which considered all the different substances as existing from the beginning and independently of one another, and made the appearance of that which predominates depend on phenomena of association and dissociation of similar elements; (3) the theory of Leucippus and Democritus, which postulated one and one only original element and explained the various aspects which it presents by supposing that the particles or "atoms" of it are susceptible of receiving different forms or having different relative positions. The fact is emphasized, as Burnet has done in his *Early Greek Philosophy,* that these theories are connected with Paramenides's idea of the invariability of the true "being": atoms were the "being" of Parmenides. The doctrine of Empedocles is examined here in some detail. It was the one most generally adopted by the ancients, by the philosophers of the middle ages, and even by the theoretical chemistry of the nineteenth century. The article is followed by another in the next number (see below) of *Scientia,* and the whole question will be discussed more fully in the first part of a forthcoming book on the general history of scientific thought.

Thomas Moreux, in an article discussing the question as to where our sun is dragging us, gives a useful sketch of the development of researches on the proper motion of the fixed stars from the earliest times up to quite modern ones. A. J. Herbertson has a geographical essay on "The Higher Units," the theme of which is to prove that "regional leviathans" ("if the geographical region is a macro-organism, then men are its nerve-cells") exist and that we each are a part of one.

Eugenio Rignano presents the second part of his studies on the evolution of reasoning, which is concerned with the progress from intuition to deduction. In the first part of this article, the author has said that parallel to, and in consequence of, the passage from concrete forms to forms more and more abstract, reasoning acquires an increasing and more extensive capacity of application, which, starting from quite simple intuitions, carries it to the most complicated deductive processes of science. It is with this aspect of the evolution of reasoning that this part is concerned. A further article dealing with the higher forms of reasoning is promised.

Sigmund Freud deals with the interest of psycho-analysis for psychology. Psycho-analysis is a medical method which tries to cure certain forms of nervous disease (*Neurosen*) by psychological technic. This article explains, by a series of examples, what the author has claimed, in a book published in 1910, for the new science.

H. Jacobi, in an article with a title asking what Sanskrit is, studies the importance and the position of Sanskrit in the evolution of language and Indian civilization. S. Jankelevitch has a critical note on the thinking horses of Elberfeld. In the department of prehistoric ethnology, Sigmund Feist gives a general review on the question of the country where the Indo-Europeans originated. There are reviews of books and periodicals, a chronicle of events in the scientific world, and a supplement containing French translations of the German, English, and Italian articles.

The first article in the number of *Scientia* for November, 1913, is the second and final part of Aldo Mieli's account of the theories of substances with the pre-Socratic Greeks. In the first part, he had shown that the early doctrines were suddenly abandoned, and three currents of thought—represented by Empedocles, Anaxagoras and Democritus and the other atomists, respectively—were formed. This part deals with the two last currents. It is very interesting to see that the doctrine of Anaxagoras, which has been quite misunderstood until of late years, is capable of taking, when developed, a quasi-modern form (see the author's article in *Isis,* November, 1913; cf. the notice below).

J. C. Kapteyn, of the University of Groningen, writes an article in English "On the Structure of the Universe," in which he considers the questions as to what the discovery of what is known as "star-streaming" has done and what it promises to do for the solution of the problems of (1) the distances of the stars from one another in the line of sight; (2) the history, that is, the evolution, of the stellar system. "It has been my aim," says the author, "to show *not* that much has been done, but that there is a beginning: *not* that we have entered far into the promised land...., but that a few pathways are being mapped out, along which we may direct a hopeful attack."

Werner Mecklenburg shows how the theory of electrolytic solutions affords an example of how two currents of investigation, which seemed quite independent of one another (Pfeffer, Raoult), were united in a higher synthesis (Van't Hoff).

Sigmund Freud, in the second part of an article continued from the preceding number of *Scientia,* deals with the interest of psycho-analysis for the non-psychological sciences, comprising the sciences of language, philosophy, biology, the history of evolution, the history of civilization, the fine arts, sociology, and pedagogy. Charles Guignebert, in the first part of an article on the dogma of the Trinity, discusses the primitive triads and the baptismal formula, and shows, on a particular example, how the fundamental beliefs of a religion originate, develop, are fixed, weaken, and die. A. van Gennep has a critical note on the lacunae of modern ethnography.

There are two general reviews: one a biological one by H. Piéron on the evolution of modern scientific opinion on the question of mimicry; and the other by W. Oualid, which is an annual review of economy. There are the usual book reviews, review of reviews, chronicle, and supplement containing French translations of the German, Italian, and English articles.

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The second number of *Isis* appeared in August, 1913, and began with a short note by the editor (George Sarton) on the aim of *Isis*. *Isis* is the only review in which the methodological, sociological, and philosophical points of view are associated with the purely historical point of view; this association is effected because it is only by making all these points of view and all these methods converge that historical researches acquire their full signification. Still, history, though an indispensable instrument, is a means and not an end: the end is the philosophy of the sciences. David Eugene Smith, owing to the fact that we have recently come into possession of a quantity of new material, is able to give, in an interesting article on "The Geometry of the Hindus," a presentation of some of the salient features of the Hindu geometry more clearly than has heretofore been done. Antonio Favaro has a short article on the *Carmen de ponderibus* of Guarino Veronese. There are three articles dealing with genius and heredity: one in German by Wilhelm Ostwald, one in English by W. C. D. and C. D. Whetham, and one in French by George Sarton. The second is on "Three English Men of Science"—Newton, Darwin, and Kelvin, and contains the rather surprising statement: "To each one of these men, either continuously or at some period of his existence, religion and not science seemed the end that was best worth pursuing." The third is to be continued, and is on the question of how to increase the intellectual efficiency of humanity. The present instalment contains an introduction and sections on scientific genius and genius and the race. The rest of the number is devoted to a useful chronicle of events and undertakings, analyses of books and articles, and a continuation of the admirable bibliography of recent works on the history of all the sciences.

The third number of *Isis* appeared in November, 1913, and contains seven articles, three in Italian, two in German, one in French, and one in English. Antonio Favaro writes on the well-known mathematician Niccolo Tartaglia (1499-1557) and the printing of some of his works, particularly the *Travagliata Inventione.* Julius Ruska writes on mineralogy in Arabic literature. Icilio Guareschi writes on Ascania Sobrero (1812-1888), the discoverer of nitro-glycerine, the centenary of whose birth took place last October. Agnes Arber discusses the botanical philosophy of Guy de la Brosse, who died in 1641, and was the founder and first superintendent of the Jardin des plantes of Paris. Aldo Mieli writes on the development and utilization by modern chemistry of the ancient theory of the transformation of substances of Anaxagoras, as distinguished from those of Empedocles and of the atomists. Ernst Bloch studies the ancient atomic theory in the modern history of chemistry. Finally, the editor, George Sarton, continues his article on how to increase the intellectual efficiency of humanity; the present instalment contains discussions of heredity, the inheritance of intellectual aptitudes, and environment and heredity. There is a portrait of Denis Diderot, the bi-centenary of whose birth took place last October. Various notes and reviews of books are given, and the valuable bibliography of works on the history of all the sciences is continued.

The number of *Isis* for February, 1914, concludes the first volume of this new and very interesting periodical. The editor, George Sarton, writes on the present tendencies of the history of mathematics, and begins by distinguishing between what may be called the pure historians and those—philosophers, pedagogues, or sociologists—whose aim is to *utilize* the history of mathematics for other ends. The object of the review *Isis* is that of the latter class. Then the author proceeds to discuss Léon Brunschvicg's *Les étapes de la philosophie mathématique* and Pierre Boutroux's *Principes de l'analyse mathématique,* both of which are analyzed at great length by Emile Turrière later on in the number. Though the author is very well-disposed towards both books, he finds himself obliged to conclude that neither of them realizes a complete historical and critical synthesis of mathematics. Ernst Bloch has a long and valuable article on chemical theories with Descartes and the Cartesians, and the article deals principally with Descartes, Mayow, Lémery, Guillaume Homberg, Johann Bernoulli, Steven Blankaart, and Georg Ernst Stahl. Then follows Gino Loria's stimulating address to the International Congress of Historical Studies at London in 1913 on the mathematical glories of Great Britain—Bede, Alcuin, Abelard of Bath, Roger Bacon, John Peckham, John Holywood, Thomas Bradwardine, Richard of Wallingford, John Maudith, Cuthbert Tonstall, James Gregory, Robert Recorde, William Oughtred, John Napier, Thomas Harriot, Henry Briggs, Henry Savile, Isaac Barrow, John Wallis, Lord Brouncker, John Caswell, William Neil, Christopher Wren, Kenelm Digby, John Pell, Isaac Newton, John Craig, James Stirling, Patrick Murdoch, Abraham de Moivre, Roger Cotes, Brook Taylor, Edmund Halley, Robert Simson, Samuel Horsley, William Wales, Colin Maclaurin, William Braikenridge, Edward Waring, John Wilson, James Ivory, and many names of more modern mathematicians. There are rather many mistakes in spelling, but the list is otherwise strikingly accurate. Waldemar Deonna writes on Jacques Goffarel, a precursor of the present theory of the origins of art. Philip E. B. Jourdain has a long and rather technical article on "The Origin of Cauchy's Conceptions of a Definite Integral and of the Continuity of a Function," in which the part played by Fourier is emphasized. There are various notes and reviews, a continuation of the admirable bibliography of all the publications relating to the history and organization of science, and an index to the first volume. We hope to see many more volumes of a periodical which shows a worthy carrying out of a lofty ideal. Φ